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PETROLOGY.—*The position of the vibration plane of the polarizer in the petrographic microscope.* F. E. WRIGHT, Geophysical Laboratory.

In petrographic microscopes the polarizer is mounted in one of two positions, so that its plane of light transmission is parallel either to the vertical cross-hair or to the horizontal cross-hair of the eyepiece. Certain makers prefer the first position, others the second; but with them the matter seems to be one of long standing habit rather than one of definite reason. It is, therefore, of interest to inquire into the relative merits of the two positions and, if possible, to obtain data which enable us to ascertain definitely which is the better position. In anticipation of the final result it may be stated that for an observer using light from the northern sky, the correct position depends on, and varies with, the time of day at which the observations are made. The evidence on which this unexpected conclusion is based is presented in the following paragraphs.

Of the two positions of the plane of vibration of the polarizer that position is preferable which transmits the most light. In case the light entering the polarizer is strictly non-polarized, the same amount of light is transmitted by the polarizer in either position; under these conditions both positions are equally good. If, however, the incident light be partially polarized, the intensity of illumination varies with the azimuth of the polarizer plane; that position which allows the greater percentage of the polarized light to pass is then obviously the better.

The chief factors which produce partial polarization in the incident light are: (a) polarization by reflection at the surface of the substage reflector; (b) sky polarization.

(a) At first thought it would seem that the first factor is exceedingly important because of the pronounced polarization effect which a plane glass surface produces on reflected rays. The line of vibration for such reflected rays is the normal to the plane of incidence; hence the natural inference is that the preferable position for the plane of vibration of the polarizer is from right to left, parallel to the horizontal cross-hair. But in the case of the silvered mirror we have to do not only with reflection at a glass surface but chiefly with metallic reflection; and for such a surface the percentage intensity of polarization by reflection is in general much less than at a glass surface. Measurements, with a Koenig-Martens polarization photometer, of the relative intensities of the light rays reflected from the substage mirror (metallic reflection) show that the intensity of the rays vibrating normal to the plane of incidence is less than 10 per cent greater than that of the rays vibrating in the plane of incidence; this difference is for practical purposes not of sufficient importance to exclude either position. Unless, therefore, the source of light is distinctly polarized we must conclude that, practically, the one position is as good as the other.

(b) It has been known for nearly a century that much of the light from the sky on a clear day is polarized. Arago, Babinet, and Brewster were the first to discover and to study sky polarization, and since their time many investigators have studied the phenomenon. The literature on the subject is voluminous. The general results of this study so far as it pertains to the present problem are: The light from the different parts of the sky is not uniformly polarized but is at a maximum in the plane polar to the sun; this plane is also the plane of vibration of these polarized rays. The percentage of sky polarization decreases from the polar plane toward, and away from, the sun until the neutral points of no polarization (called Babinet and Arago points and situated about 20° from the sun and its antipoint respectively) are reached; beyond these the sky polarization again increases.

In the early morning and late afternoon the sun is near the horizon on the east or west and the plane of maximum sky polarization is approximately a north-south vertical plane passing through the zenith. The vibration plane of rays contained in this vertical plane and incident on the microscope facing north is parallel to the vertical cross-hair of the microscope. Measurements by H. H. Kimball[1] and others prove that between 50 and 80 per cent of this light is plane-polarized, the actual percentage varying with a number of factors which need not be discussed here. Under these conditions the intensity of the transmitted light, when the plane of the polarizer is in the plane of symmetry of the microscope, is more than twice that when the polarizer is parallel with the horizontal cross-hair.

At noon, on the other hand, the sun is in the south and its polar plane is an inclined plane intersecting the horizon on the east and west. The plane of vibration of the rays from the north incident on the microscope is essentially parallel to the horizontal cross-hair. Under these conditions the most favorable position of the polarizer plane is from right to left or at right angles with the early morning position.

On cloudy and misty days the amount of sky polarization decreases rapidly and is practically negligible. On such days the position of the polarizer plane has little effect on the intensity of the field illumination in the microscope.

If on a clear day the observer wishes to obtain the maximal illumination it is necessary to set the plane of the polarizer parallel to the vertical cross-hair in the early morning or late afternoon and then toward noon to turn it to the horizontal position. But such a procedure is not always convenient as the polarizer is commonly fixed in position; in view of the fact that at noon time there is always an abundance of light from a clear sky while in the early morning and late afternoon the sky illumination is less than half that at noon, the position of the polarizer which favors greater intensity of illumination at early and late

[1] Proc. Third Convention of Weather Bureau Officials, Peoria, Ill. 1904, p. 69. Bull. Mt. Weather Observatory, **1**, pt. 2: 38–48. 1908. Ibidem, **3**, pt. 2: 113–114. 1910. Jour. Franklin Institute, **171**: 333–344. 1911.

hours is to be preferred as the fixed position. In this position the plane of vibration of the rays emerging from the polarizer is parallel with the vertical cross-hair of the eyepiece.

An extended series of tests by the writer with the petrographic microscope corroborates these statements in detail, the general conclusion being that, although either position of the polarizer is permissible, there is a slight practical advantage in having the plane of vibration parallel to the vertical cross-hair.

ENTOMOLOGY.—*A new generic name for the screw-worm fly.* CHARLES H. T. TOWNSEND, Bureau of Entomology.

The screw-worm fly is an insect of much economic importance from both the medical and veterinary standpoints. Its maggots, known as screw-worms, have been repeatedly found to infest diseased nasal sinuses and unguarded sores in man; while they also extensively infest open sores and all cuts, wounds, or other skin abrasions in cattle, horses, mules, sheep, hogs and other stock, as well as dogs and various other animals.

The screw-worm fly was originally published as *Musca macellaria* by Fabricius[1] and Wiedemann.[2] In 1875 Rondani[3] erected the genus *Compsomyia* to include two European and four East Indian species. In 1893 Brauer & Bergenstamm[4] selected *macellaria* as the type of *Compsomyia*, but this can not hold since it is not an originally included species. In 1910 Coquillett[5] designated *Musca dux* Eschscholz as the type of *Compsomyia*, which is evidently valid since there seems to have been no previous designation that can hold.

In 1863 Rondani[6] mentioned *Musca marginalis* Wiedemann, of Africa, as the type of Desvoidy's genus *Chrysomya*;[7] this is not a strictly valid designation, as the name is not originally included or designated in synonymy by Desvoidy, but Coquil-

[1] Syst. Ent. 776. 1775. Syst. Antl. 292. 1805.
[2] Auss. Zw. Ins. **2**: 405. 1830.
[3] Ann. Mus. Civ. St. Nat. Genova, **7**: 425–427. 1875.
[4] Denkschr. Math.-Nat. Cl. Kais. Akad. Wiss. **60**: [91] 179. 1893.
[5] Proc. U. S. Nat. Mus. **37**: 526. 1910.
[6] Arch. Zool. Modena, **3**: 27. 1863.
[7] Essai Myod. 444. 1830.

lett[8] clinched it in 1910 by designating *regalis* R.D. (= *marginalis* Wd. acc. Bezzi)[9] as the type. A careful comparison of *dux* and *marginalis* shows that they are undoubtedly congeneric, at least so far as can be made out from external characters. Therefore *Compsomyia* apparently becomes a synonym of *Chrysomya*.

Chrysomya is confined to the Old World, while *macellaria* and its congeners are confined to America. The latter are generically distinct on external adult characters from both *dux* and *marginalis* and all the Old World species. *Compsomyia* originally included only Old World species and thus it could not, in any event, have been used for *macellaria*.

Musca macellaria is wrongly cited by Coquillett[10] as the type of *Paralucilia* Brauer & Bergenstamm,[11] by accepting the synonymy of E. Lynch-Arribalzaga,[12] who gives *Calliphora fulvipes* Macquart[13] as a synonym of *macellaria*. This synonymy can not be accepted, since Brauer & Bergenstamm[14] state that *fulvipes* Macquart, for which they erected *Paralucilia*, has the vibrissae close on the oral margin and not constricting the facial plate.

In 1883 Brauer[15] cited the generic name *Callitroga* Schiner MS. as having been applied to *macellaria* and its relatives; and in 1893 Brauer & Bergenstamm[16] state that this name was used in this sense by Schiner in the collection, evidently on labels. The standing of the name *Callitroga* is thus that of a manuscript name cited in synonymy; wherefore it is not validated and hence is not available for use.

It thus appears that there is no generic name in existence that can be used for *macellaria*. It is the purpose of this

[8] Proc. U. S. Nat. Mus. **37**: 523. 1910.
[9] Bull. Soc. Ent. Ital. **39**: 48. 1907.
[10] Proc. U. S. Nat. Mus., **37**: 584. 1910.
[11] Denkschr. Math.-Nat. Cl. Kais. Akad. Wiss. **58**: [87] 391. 1891.
[12] Anales Soc. Cient. Arg. **10**: 71. 1880.
[13] Dipt. Exot. **2**: 3, 132 [289]. 1843.
[14] Synopsis in Denkschr. Math.-Nat. Cl. Kais. Akad. Wiss. **60**: [90–92] 178–180. 1893.
[15] Denkschr. Math.-Nat. Cl. Kais. Akad. Wiss. **47**: 74. 1883.
[16] Denkschr. Math.-Nat. Cl. Kais. Akad. Wiss. **60**: [106] 194. 1893.

paper not only to demonstrate this fact, but also to supply the deficiency.

Cochliomyia Townsend, gen. nov.

Genotype, *Musca macellaria* Fabricius, Syst. Ent. 776. 1775.

Differs from *Chrysomya* R.D. by the epistoma being well elongate, well narrowed by the vibrissal angles, and its plane normally nearly or quite in the vertical. The vibrissae are well removed from the oral margin, normally by a distance equal to twice the length of the second antennal joint. The third vein may be either almost bare or distinctly bristled more than half way to the small crossvein. The parafacials are pubescent. The hind scale of tegulae is not hairy on posterior half, but bare. Antennae not separated at base. The epistomal characters are almost a duplication of those of *Pollenia*.

The generic name has reference to the popular name of the maggot—*screw*-worm.

The genera *Pollenia* and *Cochliomyia* stand removed from all the other Muscidae (syn. Calliphoridae) on the epistomal characters including the constricted facial plate. Other forms having the vibrissae far removed from the oral margin, as *Thelychaeta* B. B. (East Indies) and *Apollenia* Bezzi (Africa), do not have the facial plate strongly constricted, and further differ in having the antennae separated at base. *Chrysomya* R.D. has the plane of epistoma at an angle of about 45° to the vertical, and while the facial plate may be somewhat constricted the epistoma is neither so narrowed nor so elongate as in the present genus; it also has the hind scale of tegulae hairy on posterior half, and the parafacials are practically bare.

The extensive synonymy that has been given by E. Lynch-Arribalzaga for *macellaria*, and quoted by others,[17] cannot be accepted without very careful verification in each case. Certain of the species described are undoubtedly valid. Some of them belong to *Paralucilia* and not to *Cochliomyia*. *Chrysomya wheeleri* Hough, of California, belongs to *Cochliomyia*. The writer has collected a species of *Cochliomyia* in the Andes of Peru which is abundantly distinct from *macellaria* and which occurs at an altitude of over 12,000 feet. He has also taken specimens in Peru that are evidently to be referred to *Paralucilia*, and has seen others from Brazil that belong to the same genus, all closely resembling *macellaria* in the vittate thorax and other superficial characters. Thus it can be seen that much confusion has resulted from the attempts to lump all the names in question.

[17] Williston, Proc. U. S. Nat. Mus. **12**: 203. 1889. Giglio-Tos, Ditt. Mess. IV (Mem. R. Acc. Sc. Torino, ser. 2, **45**), 5-6. 1895. Aldrich, Cat. No. Am. Dipt. 517. 1905.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. Each of the scientific bureaus in Washington has a representative authorized to forward such material to this journal and abstracts of official publications should be transmitted through the representative of the bureau in which they originate. The abstracts should conform in length and general style to those appearing in this issue.

GEOLOGY.—*Geology and oil resources of the west border of the San Joaquin Valley north of Coalinga, California.* ROBERT ANDERSON and R. W. PACK. U. S. Geological Survey Bulletin 603. Pp. 220, with 15 plates and 5 figures. 1915.

The region described forms the eastern foothills of the Diablo Range, which is the easternmost component of the Coast Ranges in central California. In the higher parts of the range, altered sedimentary and igneous rocks of probable Jurassic age outcrop. Overlying these rocks are thick unmetamorphosed Cretaceous and Tertiary sedimentary formations, with basaltic intrusives and flows in two very small areas. The post-Jurassic sedimentary formations are mainly arkosic sandstones and shales, but there are two persistent shale formations, each over 1000 feet thick, composed largely of the remains of diatoms and foraminifera. One of these formations is of Upper Cretaceous age; the other is probably Oligocene. The Cretaceous rocks all belong to the Chico or Upper Cretaceous phase, and aggregate the astonishing thickness of something over 23,000 feet.

The structure of the region is predominantly monoclinal, forming the eastern flank of the great anticlinal structure that determines the Diablo Range. The regularity of the monoclinal structure is broken, however, by several anticlinal folds that head in the central part of the range and, trending obliquely to it, extend out toward the San Joaquin Valley. Faults are relatively few and only locally dominate the structure.

The petroleum apparently originated in the diatomaceous shales, and at present is found in, or in close association with, the two formations that are composed largely of that material.

The anticlinal folds that trend obliquely to the course of the main range appear to be the chief structural features governing the accumulation of oil. The petroleum has apparently migrated, both vertically, from the organically formed shales into the more porous sandstones that overlie them, and laterally up the dip through the porous beds. Shale lying beneath the broad San Joaquin Valley is believed to have yielded much of the oil now found in the anticlines along the foothills. The oblique folds appear to have a protecting influence upon the concentration of petroleum in the main range, for oil occurs not only along the higher parts of the oblique anticlines but also in the flank of the main range just back of these folds, or in other words in the flanks of the syncline that lies between the oblique anticline and the main range. Oil is not found, however, in the flank of the range where there s no anticlinal fold lying between the main range and the San Joaquin Valley. R. W. P.

GEOLOGY.—*The phosphate deposits of Florida.* G. C. MATSON. U. S. Geological Survey Bulletin 604. Pp. 101, pl. 17, 2 figs. 1915.

This publication describes the distribution, geology, character, occurrence, origin, age, and consumption of the Florida phosphates. Several pages are devoted to descriptions of methods of preparing the rock for market. A bibliography of Florida phosphates closes the work.

There are several different types of phosphate rock in Florida, but only two of them, rock phosphate and land pebble, are important. In the rock phosphate deposits the phosphate is embedded in a fine-grained matrix and a deposit that will yield 25 per cent of valuable rock is regarded as rich. The river pebble deposits are of fluviatile origin and the fragments of which they are composed show mechanical abrasion. The matrix of the river pebble deposits consists of sand and clay. The land pebble is believed to have been derived secondarily from the underlying phosphatic bed rock.

The deposits are found in sedimentary rocks and with few exceptions are of secondary origin. They are all of Tertiary age and lie in depressions in the surface of lower Oligocene limestones. The land pebble phosphate has been assigned to the Miocene, but may be as late as Early Pliocene. The river pebble deposits are in part Pleistocene and in part Recent. The various theories that have been advanced to explain the origin of the deposits are reviewed at length.

W. C. PHALEN.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE BOTANICAL SOCIETY OF WASHINGTON

The 104th regular meeting of the Botanical Society of Washington was held at the Cosmos Club on the evening of Tuesday, April 6. 1915. Forty-five members and fifty-three guests were present. The following papers were read:

Prepaleozoic algal deposits: CHARLES D. WALCOTT. Mr. Walcott described the stratigraphic position of the great Prepaleozoic Beltian series of central Montana, which he considered to be of fresh or brackish water origin, in all probability deposited in a great inland lake or lakes covering an area of about 6,000 square miles, and also on river flood plains as sand and gravel, or perhaps as fine dust carried by winds. The formations consist of sandstones, calcareous and siliceous shales, and beds of limestone, the last varying in thickness from a few inches to several thousand feet. The same type of deposits also occurs in the Grand Canyon region of Arizona and extends northward along the main ranges of the Rocky Mountains far into Alberta and British Columbia.

At a horizon approximately 9000 feet below the base of the Cambrian numerous reefs of algal deposits occur at several horizons in the Newland limestone formation of the Beltian in Montana, and isolated concretionary-like forms occur scattered at various levels in the overlying Spokane shales of the Belt Mountains. The algal remains occur in many forms, some of which are surprisingly similar to those of the fresh-water lake and stream blue-green algal deposits of Pennsylvania, New York, Michigan, etc. Others are similar in appearance to the blue-green and green algal deposits of the thermal waters of the Yellowstone National Park.

Mr. Walcott illustrated by lantern slides the various forms of algal deposits as they are found in the Pre-Cambrian rocks and in recent deposits. Photographs of thin sections of both the fossil and recent deposits showed similar chains of cells which are characteristic of the blue green alga. Other photographs illustrated recent bacteria and those associated with the algal remains in the Prepaleozoic of Montana. These included the Micrococci, with both round and oval cells. Some of the sections appear to carry rodlike bacilli.

The algal flora of some Eocene shales: CHARLES A. DAVIS. Extensive beds of petroleum yielding shales of Eocene age occur in northwestern Colorado and westward. They are carbonaceous, and when fresh are dark brown, hard, tough and compact, with a bituminous odor.

So far as observed, they contain no free oil, but yield petroleum on distillation.

By modifying methods of sectioning employed by various investigators in studying coals, the author successfully sectioned these shales by microtome. The sections show an organic detrital rock containing an extensive microscopic flora which includes a large number of perfectly preserved micro-algæ related to blue-green and higher types.

Thirty-five lantern slides showed the various algæ found in these shales.

Algae in the Upper Paleozoic: DAVID WHITE.

The 105th regular meeting of the Botanical Society of Washington was held at the Cosmos Club, Tuesday, May 4, 1915, at 8 p.m. Thirty-three members and four guests were present. Dr. GEORGE R. LYMAN was elected to membership. Dr. CAMILLO SCHNEIDER, general secretary of the Dendrologischen Gesellschaft of Austria-Hungary, was present as a guest of the society. The scientific program was as follows:

The botany of Western Yunnan (China): DR. CAMILLO SCHNEIDER. Dr. Schneider had just returned from a year's journey in the high mountains of western Yunnan. In the region of the upper Yangtze he carried on investigations in botany, zoology and ethnology. He obtained a great number of colored photographs taken from nature (Lumière, autochromes) of which he exhibited 25 with the lantern. These showed most interesting plant types of the high mountains near Li Chiang at an elevation of 10,000 to 17,000 feet. Especially striking was a recently discovered *Primula* (*P. Littoniana*) with a spiked inflorescence which resembles an orchid rather than a *Primula*. The buds are of a dark purple, while the open flowers are lighter colored. A very peculiar plant of biological interest is a new *Saussurea*, which inhabits limestone boulders at about 17,000 feet and has the flowers hidden among the leaves, which are densely hairy and protect them from snow and frost. The virgin forest of the Li Chiang zone consists chiefly of *Pinus Massoniana*, various *Piceas*, *Abies Delavayi*, *Tsuga yunnanensis*, and evergreen oaks, together with many Rhododendrons and numerous other shrubs. The cryptogamic flora is very rich. Dr. Schneider has collected over 3000 different species of phanerogams and ferns.

The genus Endothia: DR. N. E. STEVENS. (To be published in full elsewhere.)

Endothia pigments: DR. LON A. HAWKINS. (To be published in full elsewhere.)

Identification of the teonanacatl, or "sacred mushroom" of the Aztecs, with the narcotic cactus, Lophophora Williamsii, and an account of its ceremonial use in ancient and modern times: MR. W. E. SAFFORD.

The early Spanish writers describe certain feasts of the Aztecs in which a narcotic called by them *teonanacatl*, or "sacred mushroom," was used as an intoxicant. Bernardino Sahagun, writing before 1569, states that it was the Chichimeca Indians of the north who first dis-

covered the properties and made use of these "evil mushrooms which intoxicate like wine." Hernández distinguishes them from other mushrooms (*nanacame*, plural of *nanacatl*,) which are used as food, by the distinguishing adjective *teyhuinti*, inebriating, "*quoniam inebrare solent.*" The belief survives that the drug thus used was a mushroom. According to Rémi Siméon, the *teonanacatl* is "une espèce de petit champignon qui a mauvais gout, enivre et cause des hallucinations." (Dict. de la langue Nahuatl, p. 436, 1885.)

Investigations by the author have proved that the drug in question is not a fungus but a small, fleshy, spineless cactus endemic on both sides of the Río Grande in the vicinity of Laredo, Texas, and in the state of Coahuila, ranging southward to the states of Zacatecas, San Luis Potosí, and Querétaro, a region inhabited in ancient times by the tribes called Chichimecas. The drug is prepared in two principal forms: (1) discoid, in which the head of the plant is cut off transversely and, when dried, bears a close resemblance to a mushroom; (2) in longitudinal pieces or irregular fragments, in which the entire plant, including the tap root, is sliced longitudinally into strips like a radish or parsnip, bearing no resemblance whatever to a mushroom, and designated by early writers as *peyotl*, and also as *raiz diabolica*, or "devil's root."

The first to call attention to the ceremonial or religious use of this drug by the Indians of today was Mr. JAMES MOONEY, of the Bureau of American Ethnology, in a paper read before the Anthropological Society of Washington, November 3, 1891. Since the time of Mr. Mooney's observations the use of the drug has spread widely among the Indians of the United States, by whom it is commonly called "mescal button" or "peyote."

Efforts have been made to prevent the Indians from using it, chiefly because it is believed by some of those interested in the Christianizing of the Indians that it has a tendency to make them revert to their primitive condition and to their heathen beliefs. Action was taken in the courts to prosecute a certain Indian for furnishing this drug to the Indians of the Menominee Reservation of Wisconsin on March 15, 1914. It developed that the drug was received by parcel post from the vicinity of Laredo, Texas. In a paper before the Lake Mohonk Conference in October, 1914, affidavits of certain Indians of the Omaha and Winnebago tribes of the Nebraska reservation were read. The evidence showed the existence of a religious organization among the Indians called the "Sacred Peyote Society," the ceremonial meetings of which are remarkably like those of the ancient Mexicans at which the "sacred mushroom" was eaten; and that the physiological effects, as described by those partaking of the drug, were identical with those attributed by the early writers to the *teonanacatl*. The chemical properties of the drug have been studied in Germany and the United States, especially by LEWIN, of Berlin, HEFFTER, of Leipsic, and the late ERVIN E. EWELL, of the Bureau of Chemistry, U. S. Department of Agriculture; and the physiological effects by Drs. D. W. PRENTISS and FRANCIS P. MORGAN, of Washington, D. C.; but it is not possible to give the detailed results of these investigations in the scope of the present paper.

So far as known to the speaker this is the first time the identity of the "sacred mushroom" or "flesh of the gods" with the narcotic cactus known botanically as *Lophophora Williamsii* has been pointed out. That the drug was mistaken for a mushroom by the Aztecs and early Spaniards is not surprising when one bears in mind that the potato (*Solanum tuberosum*) on its introduction into Europe was popularly regarded as a kind of truffle, a fact which is recorded by its German name *Kartoffel*, or *Tartuffel*.

PERLEY SPAULDING, *Corresponding Secretary.*

THE BIOLOGICAL SOCIETY OF WASHINGTON

The 543d meeting of the Biological Society of Washington was held at the Cosmos Club, Saturday, October 23, 1915, at 8 p.m., with President Bartsch in the chair; 85 persons present.

Under the heading Brief Notes, Dr. C. W. STILES recorded observations on blood examinations (cell counts, hemoglobin, etc.) of 600 children, between 6 and 17 years of age, in North Carolina. Dr. Stiles also discussed the International list of generic names of birds.

Under the heading Exhibition of Specimens, Dr. J. N. ROSE showed some interesting examples of humming birds' nests which he had collected in Brazil the past summer.

The first paper of the regular program was by Prof. A. S. HITCHCOCK, *Collecting grasses in the Southwest.* Professor Hitchcock spoke of his trip during the summer in the region from California to Western Texas for the purpose of collecting grasses. At Grand Canyon was found the rare *Stipa arida* Jones. At Ft. Bragg, California, was found *Agrostis breviculmis* Hitchc., known only from this locality and the western coast of South America; it is abundant on the open ground back of the sandy clay cliffs at this point. In a springy place on the side of the cliffs there was a colony of *Phleum alpinum* L. a grass of the high mountains of California; its occurrence at sea level was very unexpected. At various points in northern California occur *Danthonia americana* and *D. californica*. In these species the culms disarticulate near the base at maturity. An examination of the swollen base of the detached culms discloses, hidden beneath the sheath and prophyllum, a cleistogomous spikelet consisting of a single floret. The floret and enclosed caryopsis are much larger than those of the panicle.

Cleveland National Forest, lying east of San Diego, was visited to investigate *Calamagrostis densa* Vasey. This species, known only from the type collection by Orcutt, was provisionally united with *C. koelerioides* by the speaker (in Jepson, Flora of California, **3**:125. 1912), but he is now satisfied that the two are distinct.

An ascent was made of Humphreys Peak of the San Francisco Mountains, near Flagstaff, Arizona. These are the highest mountains in Arizona, the peaks extending above timber line. In the alpine region four species of grasses were found, *Trisetum spicatum*, *Poa rupicola*, *Festuca brachyphylla* and *Agropyron scribneri*. Collections

were made at several other places of interest: Oracle, about 45 miles north of Tucson, in company with Prof. J. J. Thornber; Big Spring, Alpine, and Del Rio, in western Texas; and the Guadalupe Mountains of southern New Mexico, especially rich in Mexican species. Prof. Hitchcock's paper was discussed by the chair.

The second and last paper of the program was by R. L. GARNER, *African studies: Things in common among men, apes, and other mammals.* Mr. Garner spoke of the courtship, family life, period of infancy, arrival of puberty, instincts, homes, habits, and moral traits of the African anthropoid apes as observed by him in their wild state, during many years of observation in Africa. Among other things he stated that the period of gestation is probably seven months; that the young ape is born with usually 4 teeth present; that twin births are exceedingly rare; that the female becomes sexually mature at from 7 to 9 years, and the male from 1 to 2 years later; that the usual length of life is 20 to 21 years; that their foods are mainly vegetable, but that flesh is an essential part of their diet; that they have no permanent homes, but travel about as nomadic families; that their sleeping position is on their back or side like that of men; that they often make their beds 18 to 25 feet off the ground, but that the young are delivered in a bed on the ground in a well drained place; that sight and particularly hearing are acute, but that smell is not much more developed than in man and that touch is less acute than in man; and that the right of ownership among them is well respected. Mr. Garner concluded by saying he hoped to return to Africa in the near future and take motion pictures of the great apes.

M. W. LYON, JR., *Recording Secretary.*

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

At the 488th meeting held October 13, 1915, at the George Washington Medical School, jointly with the Medical Society of the District of Columbia, Dr. Aleš Hrdlička, Curator in Physical Anthropology, National Museum, delivered an address on *The evolution of man in the light of recent discoveries, and its relation to medicine.* Human evolution is no longer a mere theory but a fixed part of natural history, better documented from day to day by substantial evidence. Its foundations rest upon many and important organic analogies; on actual physical remains of early man and perhaps even some of his predecessors; and on observations of the changes which are at present taking place in man.

The organic analogies are (1) the evidence of evolution in all the better known mammals; (2) the relations of various stages of the embryonic development of man to grades of life represented by some lower vertebrates; (3) resemblances in the mode of conception, the laws of development, in all other vital functions, and in death; (4) similarities between man and other mammals in organs, limbs, and all other physical as well as microscopic parts of the body; (5) close similarities in the chemi-

cal constituents of the human body and those of other mammals; and (6) the frequent presence in man of vestiges of or reversions to anatomical features still functional in some lower animals.

The physical evidence of man's evolution consists of a large series of skeletal remains dating from the early Pleistocene to the last prehistoric period. These remains show in general that the farther back we proceed the more primitive are the human features and the more closely they are related to those of the lower primates. This evidence alone is quite conclusive, although there are still, of course, many important gaps in the line of evidence, especially relating to the earlier periods; these however are gradually being filled in.

The historical and recent changes in man show us that his evolution has not as yet been fully accomplished but is still progressing, and that possibly among civilized white men it is progressing more rapidly than it has during most of its course. We see that the higher civilized white man has already in some respects outdistanced others, that he is rapidly diversifying, and that those who can not keep the accelerated pace are being eliminated by nature. Probably the most obvious changes are taking place in his teeth, which are gradually lessening in resistance, in size, and even in numbers—changes which in turn condition weakening and numerous disharmonies in the whole facial structure.

The process of human evolution has close relations to medicine—much closer, in fact, than are commonly appreciated by even the surgeon and physician. Evolution is not only constructive, but eliminative, involving weakening, degeneration, and eventual loss of parts which have become less useful, less functional. The progressive and retrogressive changes are not always harmonious or generally beneficial to the individual, and they bring about many conditions which demand medical or surgical intervention. The process of evolution bears, however, still other relations to medicine. It has prolonged the periods of infancy, childhood, and senility in man, the most dangerous periods of an organism; the assumption of the erect posture had necessarily adverse consequences, which probably have not yet been completely overcome, on the circulatory system and in seriously modifying the abdominal and pelvic drags as well as pressure, especially in pregnancy; it has intensified the sexual functions in man, the results of which are frequently untoward and even dangerous; it has caused an enlargement in the size of the head in the human foetus which necessitated a consequent enlargement of the pelvic cavity, and there are doubtless still disharmonies between the two conditions; it has resulted in greater relative slenderness of bones, even in the skull, rendering them proportionately more liable to injuries; it has brought about greater delicacy of skin, with a consequent less resistance of the body to exposure; it has induced especially a great enlargement of the brain, a process the results of which to this day offer many imperfections; and, finally, while evolution has doubtless improved various immunities in man, it is still very incomplete in this respect, and on the other hand it has evidently led to new dangers and predispositions. There seem to exist

some indications that it may in some of the most advanced groups adversely affect the ability of procreation. The evolution of man will continue, and in order that it shall proceed with the least harm and towards the greatest benefit of mankind, it will require the most enlightened and increasingly important help and service from all branches of medicine.

The paper was well illustrated and briefly discussed.

At the 489th meeting of the Society, held October 19, 1915, in the Public Library, Dr. D. S. LAMB, of the Army Medical Museum, read a paper on *The medicine and surgery of the ancient Peruvians*, giving first some account of the country and its people, their history, customs, food, and religion. We have no evidence of hospitals in old Peru. The people are said not to have studied the medicinal properties of their plants, although they well knew the properties of what is called Peruvian bark, used in malarial fevers. Whether syphilis or leprosy occurred among them is doubted. The same may be said of tuberculosis, although some writers, like Ashmead, ascribe the mutilations represented on their pottery to local skin tuberculosis, usually known as *lupus*. These mutilations have also been regarded as resulting from punishments or surgical operations. Three skin diseases are considered peculiar to the ancient Peruvians, the *mirunta*, caused by a worm entering the skin; the *verrugas*, a very fatal disease of a warty character that struck terror into Pizarro's soldiers in 1532; and the *uta*. They had the climatic, dietetic, respiratory, and heart diseases found elsewhere, and from similar causes. Malarial fevers prevailed and were usually of the tertian variety. Smallpox, measles, scarlet fever, and yellow fever were introduced by the Spaniards and their successors. The Peruvians had what seems to have been a typhus called *tabardillo*. Goitre prevailed and was said to be caused by drinking the turbid water from the mountains. They deformed the heads of their infants, very much as did the Chinook Indians of the northwestern United States, by pressure front and back; one tribe is said to do so still. Their injuries were necessarily, for the most part, much the same as now, with the exception of shot wounds and injuries caused in modern industrial occupations. They scarified and let blood, reduced dislocations, used fixation apparatus for fractures as we do, covered open wounds, cut out *pterygiums*, and trepanned the skull. This trepanning was done either directly to relieve disease and injury or simply to let out the demon that caused the trouble.

In discussing Dr. Lamb's paper, Dr. C. L. G. ANDERSON said that the predecessors of the Incas also, the people who built the megaliths at Tiahuanaco and the great fortress at Cuzco, likewise knew much about medicinal herbs. The Indians made infusions, decoctions, powders, and ointments of barks, leaves, berries, roots, and vines. A few remedies were obtained from the mineral kingdom, such as sulphur and salty earths. Certain baths and hot springs were utilized in curing rheumatism and various skin diseases. Garcilaso de la Vega says

that the use of drugs was largely prophylactic and that after the disease was well established they left nature to work its cure, merely regulating the diet. The basal idea was to eliminate the evil, whether spirit or substance. Hence, purgatives and venesection were much in vogue, as among all nations.

Throughout tropical America, the wood of the *guayacan* tree, *lignum vitae*, was held to be a specific for the venereal disease called by the Spaniards *las bubas*. Sarsaparilla was said to be the great panacea about Guayaquil. The wonderful drugs, *coca* and *quina-quina*, were peculiar to the Andean regions. The coca was chewed to ward off hunger and fatigue. Quina, later known as Peruvian bark, was the cure for fever. It was introduced into Europe about 1640. Among the common people, old women were herbalists. The new-born babe was bathed in cold water. Usually no midwife was employed. The Peruvians knew of many poisons. Witchcraft and divination were practiced.

Mr. J. N. B. HEWITT spoke of the idea of getting the evil spirit out of the patient as being common to all primitive peoples. In the Iroquois language the expression in case of sickness was "It is biting me," "biting my tooth," or "biting my head," according to the part affected. Dr. E. L. MORGAN, among others who discussed the paper, considered that trepanning probably had its origin in the idea of getting rid of the evil spirit, but was continued as a custom because of the curative results observed in some cases. Dr. LAMB, in response to an inquiry, said that the flattening of the head among the ancient Peruvians as among the Chinook Indians, probably had no effect on the intellect because it was practiced in infancy.

DANIEL FOLKMAR, *Secretary.*

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